

CENR FY2000 Monitoring Description

8/11/99

(based on revised version of the ISEC Inventory and Monitoring Team write-up of 8/10/99)

Monitoring

Importance: It has become clear that the health and wealth of the United States depends significantly on its ability to use and conserve the natural resources of its ecosystems. However, these resources, as well as our ability to use them wisely and sustainably, are at risk:

- Key habitats for breeding and wintering migratory birds are being destroyed for development and agriculture.
- The health and extent of coastal ecosystems, which serve as key spawning, nursery, and foraging habitat for many fish and shellfish, are being threatened by pollution and development.
- Some of the most visited and visible national parks and wildlife refuges are being exposed to increasing developmental pressures.
- Over 2.8 billion gallons/day of industrial waste water are discharged to ocean waters.
- Offshore oil and gas development moratoria have been imposed because existing scientific information does not effectively address environmental concerns.
- Increasing nutrients promote algal growth that can kill sea grasses, overgrow corals, deplete oxygen, and promote harmful algal blooms (HABs).
- Exotic species and changes in freshwater inputs are producing unprecedented changes in species composition and loss of biodiversity.
- Habitat losses and beach erosion are drastically reducing productivity

Safeguarding natural resources from these risks requires integrating research and management within an integrated assessment framework -- a framework that documents the status and trend in environmental conditions, evaluates the causes and consequences of those changes, and analyzes the environmental, social and economic impacts of alternative policies for dealing with those changes. At the same time, ensuring efficient and safe shipping, transportation, and recreation requires a similar assessment framework based on the need for real-time information.. The primary impediment to progress for both cases is the lack of a nationally consistent, regionally relevant, integrated coastal monitoring and observation system. Output from such a system, would not only make these assessments and real-time operations possible, but also feed research and development efforts and identify emerging issues.

Given the importance of ecosystems to the nation's economy and well-being, and the high potential for human use and natural events to adversely impact them, it is shocking to realize that so little is known about the status and trends in critical environmental variables. There exist very few **NATIONALLY CONSISTENT, COMPREHENSIVE MONITORING PROGRAMS** to provide the information necessary for effective ecosystem management.

ISEC Strategic Goals for Inventory and Monitoring: Resource managers and other federal, state, and local decision-makers need a scientifically-credible method for making policy and management decisions about our nation's natural resources. Regional-scale understanding requires the integration of site-intensive, regional survey, and remote sensing information that is not provided by any one monitoring program. Pre-planned integration of existing monitoring and research programs, with adjustment in each program to fill important gaps, will greatly improve our ability to provide Americans with the confidence that their Nation's health and future are secure, and allow resource managers to make scientifically-grounded and economically-sound decisions. Integrated monitoring at multiple scales will: (1) meet the national challenge to promulgate policies that focus new environmental protection efforts on the problems that represent the greatest risk to ecological resources, (2) avoid ineffective and costly regulation that can be generated by piecemeal or short-term monitoring strategies, and (3) greatly improve our understanding of regional environmental condition.

For the past several years, the academic, federal, state, and private sector scientists have been working toward new approaches to monitor physical, chemical, biological, conditions in the nation's ecosystems. The efforts appear to converge on a common goal: *to provide a national capability to measure, understand, analyze, and forecast natural and human-induced environmental change that effects the nation's economies, public safety, and the sustained production of ecological goods and services.*

Interagency Cooperation: Several partnership efforts will be conducted in FY2000 to coordinate the activities of resource managers, policy makers, and research and monitoring scientists among Federal and State natural resource agencies, universities, NGOs, and the private sector, including the following:

- The *Clean Water Action Plan* builds on the foundation of the existing clean water programs and proposes new steps to strengthen these programs. As part of the Plan, NOAA, EPA, DOI and USDA, in cooperation with other federal agencies, states, and tribes, will develop a plan by the end of 1999 for coordinated monitoring of coastal waters and will, by the end of 2000, develop a comprehensive report to the public on the condition of the nation's coastal waters which will address the need to restore the health of aquatic systems in watersheds not meeting clean water goals and to sustain healthy conditions in other watersheds. Other new elements of the program will reduce the public health threats of water pollution, enhance natural resources (e.g., wetlands, coastal areas, and stream corridors), prevent polluted runoff, and make water quality information more accessible to citizens.
- A similar strategy is being used by those agencies responsible for implementing new legislation calling for *National Assessments of Harmful Algal Blooms and Hypoxia*. The national assessments must rely on sparse, site-specific data and expert judgement to even document the status of the problem; it is not possible to document trends. While sufficient data were available to do a thorough retrospective analysis for the specific Gulf of Mexico/Mississippi River study, that was also called for in the legislation, such an analysis could not be repeated 5 years from now because most of the monitoring system has been shut down, or is in danger of being shut

down.

- This need for improved integration of coastal and ocean observing systems has also been identified by the Congress. In response to a Congressional request, the ***National Ocean Partnership Program***, with representation from twelve federal agencies, academia, and the private sector, has prepared a report outlining the needs and strategies for a national *Integrated Ocean Observing System* to monitor the physical, biological and chemical conditions of ocean and near-coastal waters.

Planned Outputs and Outcomes for FY 2000. Several agencies are planning new efforts in FY2000 to address critical ecosystem monitoring needs.

- **National Ecological Observatory Network.** NSF is proposing a *National Ecological Observatory Network* (NEON) extending from pole to pole, from coastal habitats to alpine systems, which will allow us to understand biocomplexity. NEON will allow a dynamic systems approach, across all levels of biological organization, to the complex interactions among the biological, geochemical, and geophysical processes of the world's ecosystems. NEON will be established by significantly enhancing existing assets at a set of biological field stations, marine labs, Long-Term Ecological Research sites, and other field-oriented research centers. Each observatory in the network will have a standardized set of research instrumentation, and will pursue a series of long-term and short-term observations and comparative research activities, as well as projects particular to that site. Observatories will also be used for observations and experiments to measure and understand the roles of humans in maintaining and perturbing biocomplexity.

During FY2000, NSF will hold several workshops to further develop plans for the National Environmental Observation Network.

..

- **Coastal Monitoring.** In FY 2000, NOAA, EPA, USGS, and NSF will develop a comprehensive coastal monitoring program strategy, consistent with both the Clean Water Action Plan and the National Ocean Partnership Program strategies, that is responsive to the national coastal monitoring needs, as identified in the ***Report on the Status of the Nation's Ecosystems***¹ and in the CENR's ***Integrating the Nation's Environmental Monitoring and Research Networks and Programs*** (1997). The program is intended to provide

¹This is an effort funded by government, industry, and foundations, is bringing together representatives from Federal and State government, academia, industry, and the environmental community, through the Heinz Center for Science, Environment, and Economics, to develop a prototype report on the status of our Nation's ecosystems. The first pilot focused on measures of ecosystem goods and services from agriculture, forests, and coasts and ocean sectors. The measures for the coasts and ocean sector were based primarily on anecdotal information or example from specific places because of a lack of nationally consistent monitoring programs.

information on the health of estuarine, coastal marine, and Great Lakes ecosystems and its relation to natural and anthropogenic factors. The proposed program will function at several spatial and temporal scales in line with the three-tier network envisioned by the CENR framework. Twenty to twenty-five **Index Sites** within the US are proposed to measure a set of common parameters that can serve as indicators of long-term trends in environmental quality and ecosystem health. Measurements at these sites will provide the basis for linking state and regional monitoring programs into national-scale assessments. Nested within this network will be higher-resolution **Regional Monitoring Programs**, developed and implemented primarily through State and local academic institutions. They will be located in estuarine and near-shore where major concerns regarding present or potential environmental quality degradation exist. Finally, to ensure consistency between the regional and national efforts, a **National Coastal Monitoring Center** is proposed to provide a focal point for coordination, data management and archiving, methods development, information dissemination, and development of periodic national-scale assessments. Supported by Federal, State, and academic sectors, this strategy will bring utilize a common operating agreement to bring together EPA's Coastal EMAP monitoring, NOAA's National Status and Trends Program, and USGS's ongoing water and coastal monitoring activities.

In addition to the increased coordination and planning, in FY2000, EPA will also fund **(President's request for EPA is \$6 million)** a demonstration of status and trends monitoring of the health of U.S. estuaries, to initiate implementation of this new interagency approach. This FY 2000 efforts will:

Focus on estuarine communities to:

- Develop baselines for tracking performance of efforts to control excess nutrients and sediment contamination
 - Include field studies involving four ORD laboratories, IAG's with NOAA laboratories, and cooperative agreements with coastal states and tribes; and
 - Provide a model of the status and trends report for estuaries in late 2000.
- **The Delaware River Basin Pilot Project.** Several agencies will work together in FY2000 to develop a scientifically-credible framework for integrating environmental and socio-economic monitoring and related research. The framework will link data for multiple media (land, air, water and coastal resources) and across many spatial and temporal scales through (a) collaboration of existing programs at the State, local, NGO, and Federal levels, (b) establishing new monitoring where critical gaps are observed, and (c) enhancing models that support integrated ecosystem assessments. Once fully in place, the Framework will help decision makers better anticipate causes and consequences of environmental change under a wide range of scenarios and alternatives. Anticipated FY2000 outcomes and outputs for the Delaware River Basin pilot study area include **(President's request for USDA is ??? million)**:

- Significant improvement in resolution of land-use-, habitat, vegetation, and other remote sensing coverages through systematic ground truthing using data from surveys and intensive monitoring areas.
- Linked surveys of soil and crops (NRI), forest health (FHM), forest growth (FIA), water quality and habitat (EMAP and NAWQA), and agricultural inputs and exports (NABS).
- A network of integration areas for intensive monitoring of ecosystem function (i.e. several ecosystem components measured together in one area) which represent forested, agricultural, urban/suburban, and coastal/estuarine environments and be linked to the surveys by common measurements.
- A network of satellite intensive monitoring areas comprised of existing research and monitoring stations that are making some but not all of the measurements made at the integration areas
- Improved models for linking process-level understanding developed at intensive sites to regional-scale surveys and remote sensing coverages
- Information that addresses sources of estuarine eutrophication and the causes of unusually-low secondary productivity in the Delaware Bay
- Specific information needed to improve assessments of nutrients, toxics, and habitat-changes issues in the northern portion of the Mid-Atlantic region.
- The Framework is an opportunity for more cost-effective, scientifically-rigorous, and comprehensive environmental monitoring that is currently available in the United States
- The Framework provides a “thermostat” for tracking the wise use of the nation’s resources and ensuring that future generations can also have a livable environment in which to live
- The Framework provides increased utility of federal monitoring and research programs to the needs of local and state planners through the coordination of citizen-volunteer monitoring programs and inclusion of those programs through parallel database structures and comparability screens
- Industry supports rigorous monitoring of the environment because it will help to “keep the goalposts from constantly changing.” The framework provides real long-term data on cause and effect
- The Framework test in the Delaware will provide a means to assess the cost-effectiveness of management systems established to protect natural resource condition, thus providing greater equity among stakeholders.
- Mechanisms for linking citizen volunteer monitoring to monitoring by professional monitoring programs and
- Once fully in place, the Framework will help decision makers better anticipate causes and consequences of environmental change under a wide range of scenarios and alternatives.

Value Added from Integration: Evaluations of the Delaware Basin Pilot Study will measure and document the practical value of integration, particularly any increase in our ability to

perform ecosystem-level assessment, support environmental decision-making, and guide the setting of environmental policies. A retrospective analysis of specific environmental issues using existing data will provide a baseline for comparison of assessment capabilities during the first year of the pilot. A comparison of the retrospective analysis with the field test will allow an evaluation of the value added when data integration is built into the design of monitoring programs before data collection begins. Such evaluations will provide the critical foundation for comprehensive long-term implementation of integrated monitoring at a national scale in subsequent years.